BEST AVAILABLE IMAGES

Defective images within this document are accurate representation of The original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

115,945

PATENT SPECIFICATION

Application Date, June 27, 1917. No. 9238/17.
Complete Left, Jan. 25, 1918.
Complete Accepted, May 30, 1918.

PROVISIONAL SPECIFICATION.

Improvements in or relating to Pneumatic Tyres.

I, EDWARD BRICE KILLEN, 27, Queen Victoria Street, London, E.C., Engineer, do hereby declare the nature of this invention to be as follows:—

This invention relates to a new type and construction of pneumatic outer cover, and an important feature of the invention is the tread, which is the widest part of the tyre and gable-like in shape. The tread is constructed to vary much in width in road contact according to the load carried or shock received; and to have the greatest possible number of inches in road contact circumferentially under ordinary working conditions. By means of this invention inflated tube tyres may be greatly improved in their resiliency or shock absorbing qualities, and in their durability or mileage, besides having many other advantages. The walls of the tyre cover are constructed so that the most severe hingeing or flexing takes place at the widest and safest part of the air chamber, and not at those places where existing tyre covers are often prematurely injured. In my tyre the walls of the cover are constructed thinnest at the widest part of the air chamber, but these thin walls are protected from injury by my special construction of tread, and the widest part of my tyre is not the belly part of the tyre as in existing pneumatic tyres. The construction of my gable-like wide treading circumference is of vital importance, because it not only prevents the thinnest and most flexible part in each tyre wall from coming into contact with kerbstones, but it protects the tyre in many other ways from injury, say when the tyre is overloaded or travelling on badly cambered roads, or turning corners sharply, or passing over potholes, or when subjected to those abnormal working conditions which often prematurely destroy existing inflated tyres. It is to be specially noted that under ordinary working conditions the extreme treading circumference of my tyre has a greater flat in road contact circumferentially than existing pneumatic tyres of similar diameter, and that the effective width of the tread of my tyre is ever changing, having less width in road contact when carrying a light load than when carrying a heavy load, and much more width in road contact than existing inflated tyres have with a similar air chamber when absorbing an abnormal shock.

My new and special construction of tread enables the tyre to stand shocks which would destroy the fabric or foundations of existing tyres, without my tyre being injured, and it is to be noted that the rubber in the apex of the gable-like tread is automatically compressed when in action, and the more severe the strain, the greater is the rubber compression and this compression

[*Price 6d.*]

takes place without the fabric or foundation of the tyre cover being injured, th tyre being constructed so that its extreme circumference can give much in road contact under ordinary working conditions, and stand abnormal strains under severe working conditions. The gable-like construction and extra width of tread enables the extreme apex of the tyre to come into road contact and be put under compression before the remaining width of the tread comes into action. In fact, by means of this invention more inches of tyre wall circumferentially are brought into road contact to carry the load, and there is always a reserve of tyre width or what I will call the margin of safety in the tyre which automatically comes into effective action as and when required, say when passing over potholes, or running over tramway lines or in absorbing those stones or inequalities which prematurely destroy existing tyre covers, and although the apex or extreme treading circumference of my tyre has more "give" in road contact than what I call the margin of safety part of the tread, yet this margin of safety part is as resilient under ordinary working conditions as the treading circumference of an existing inflated tyre.

I preferably strengthen and thicken the fabric in each wall close to the base bead, and may mould on each wall outside the base bead and its tyre retaining metal rim, an endless strengthening and cushioning rubber rib. This construction of tyre cover compels the severest flexing of the tyre walls to take place close to the widest part of the air chamber, which is the safest place to flex at, and saves those places in the foundation of my cover where existing tyre covers are liable to prematurely wear out under severe working conditions.

In this invention the walls of my tyre cover may be built up in any efficient and well-known manner with a fabric, cord or other suitable foundation, provided the treading circumference of the tyre (which may be constructed practically unpuncturable) has a great flat in circumferential road contact under all working conditions, the extra width of the tread only coming into action as and when required. The difference in the extreme diameter of the apex of the tread and the extreme diameter of the right and left edges of the tread may be 2 to 4 inches, and the width of the tread may be $\frac{3}{4}$ inch to $1\frac{1}{4}$ inches wider than the extreme width of the belly part of my tyre, according to the type or dimensions of the tyre manufactured, but in all cases the width of the tread must be sufficient to protect the belly part of the tyre where the walls are thinnest from kerbstones, even when the tyre is under-inflated. The internal circumference of the tyre cover may in cross-section be constructed similar to the internal circumference of existing tyre covers, but when the cover is rigidly attached to its tyre retaining metal rim, I prefer that the two base beads, which are preferably manufactured strong and stiff, are attached so that the maximum area or air space is obtained within the cover. I may circumferentially and centrally divide existing tyre retaining metal rims with hooking flanges, and mechanically attach the two stiff beads rigidly in position between their hooking flanges, without requiring to stretch the base beads by levering them over the hooking rim. I also prefer that the toes of the two base beads are rigidly held tightly down against the metal bed of the tyre retaining rim and without depending upon the compressed air within the tyre to keep the tyre cover rigidly in position, and thereby making it impossible for the cover to come off or creep round its metal retaining rim if the tyre becomes deflated. This may be accomplished by making the two half endless hooking tyre retaining rims into a clamping circumference device and fitting between the base beads say three or more suitable metal base bead clamping brackets which may be arranged to lie snugly embedded in corresponding cavities moulded on each base bead. The metal clamping brackets keep the toes of said base beads tight down against the metal bed circumference and prevent any possibility of the tyre cover creeping round or leaving its tyre retaining rim even if the tyre becomes deflated.

I may mould on each side of the apex of the tread suitable cavities or spaces. These cavities in plan may form right-angled parallelograms having their angles blunt so that serious frictional contact of surfaces is prevented. Th cavities may be moulded in plan at each side of the apex, so that one cavity ends on the cross-section line where the other begins. The treading apex lying between the cavities may be from ¾ to 2½ inches wide, according to the type and dimension of tyre manufactured, and the rubber in the treading apex when under compression may be partly spewed into the cavities at each side. The extreme circumference of the apex is constructed to easily pass through grease or mud and get into direct biting contact with the hard road surface, thereby forming a good non-skid device without the use of steel studs. Although in plan each of the spaces or cavities at each side of the apex may form a parallelogram, in cross-section each space may form a triangle with an open base, and an obtuse angle formed at the apex of the triangular shaped cavity. This construction of tread enables said cavities to be easily moulded on the tread by simply pressing the two halves of a suitable mould together, the bottom of each cavity or space formed on each side of the endless treading apex being say of gable-like formation, and all the cavities so formed preferably extend to the extreme right and left edges of the tyre. In this gable-like construction of tread it is to be specially noted that an extra strong and practically unpuncturable foundation may be used in building up the tyre cover without interfering with the tyre's great resiliency or shock absorbing qualities, because the narrow treading apex causes that part of the tyre's foundation which forms the arc of a circle within the apex, to be easily and safely hinged and bent back to a considerable extent in spite of the air pressure, as the treading circumference comes into road contact, and this flexing of the tyre's outer circumference occurs without injuring the foundation, causing a new technical effect to be obtained in the treading circumference.

If wanted, the gable-like treading circumference may have metal studs attached in manufacture in any well-known manner, but in manufacturing the tread with metal studs, it must be remembered that the rubber in the gable like tread when in ground contact is put under compression, and therefore the attachment of the metal studs to the tread must be arranged by the manufacturer in such a manner that the metal studs are not liable to be easily pulled away from their foundation even under severe road work.

It is to be noted that in cross section the extreme outer circumference of my tyre, namely the apex, not only comes into contact with the road before any other part of the treading width, but it remains in close and biting contact with the road all the time whilst the extra width comes in and goes out of road contact, and the entire width of the tread when brought into action under abnormal shocks does not interfere with the biting contact of the apex of my tyre. It is, however, the extra amount of tyre wall circumferentially brought into, action and/or the margin of safety in the width of the tread which often saves my tyre from destruction under abnormal working conditions or shocks.

In this invention I take full advantage of my gable-like construction of tread to safely obtain the greatest possible amount of "give" in road contact in an inflated tyre under ordinary working conditions, and I provide a margin of safety in the width of the gable-like tread which comes into full effective action under abnormal conditions as and when required.

This new construction of pneumatic tyre cover enables an inflated tyre to be manufactured having the advantages of a narrow tread without its disadvantages, and the advantages of a wide tread without its disadvantages, and it can be constructed in all suitable dimensions and of suitable materials & used with suitable air tubes.

Dated the 27th day of June, 1917.

E. B. KILLEN.

COMPLETE SPECIFICATION.

Improvements in or relating to Pneumatic Tyres.

I, EDWARD BRICE KILLEN, of 27, Queen Victoria Street, London, E.C. 4, England, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a new type and construction of pneumatic tyre outer cover, and an important feature of the invention is the tread, and the widest part of the tyre.

In order that my invention may be properly understood and readily carried into effect, I have hereunto appended one sheet of drawings, of which

Figure 1 is a cross section of a tyre under a minimum or no load made in accordance with and embodying my invention.

Figure 2 is a similar cross section view representing the tyre under abnormal shock or load, and

Figure 3 is a diagram representing the circumferential depressions or flats formed under the varying tyre depressions of say ¼ inch, 1 inch and 1½ inches respectively, all hereafter more fully referred to and described.

My construction having reference to the drawings, is as follows:—

My wide tread 1, 2, is constructed to vary much in effective width in road contact, see Figures 1 and 2, according to the load carried or shock received, and to have the greatest possible number of effective inches in road contact circumferentially under ordinary or abnormal working conditions, thereby distributing the load or strain over more inches of tyre wall circumferentially.

By means of this invention, inflated tube type of tyres may be greatly improved in their resiliency or shock absorbing qualities, and in their strength, durability and mileage, besides having many other advantages. The tread and walls of the outer cover are constructed so that the most severe hingeing or flexing takes place close to the widest and safest part of the air chamber, see Figure 2, and those places 3, 4, 5 and 6 where existing tyre covers often prematurely burst or collapse, are in my tyre covers strengthened or protected from injury. In my tyre, the walls of the cover are constructed thinnest close to the widest part 7 and 8 of the air chamber, but these thin walls are protected from injury by my special construction of wide tread 1 and 2, the widest part of my tyre being the tread and not the belly part as in existing inflated pneumatic tyres. The construction of my gable-like wide treading circumference is of vital importance, because it not only prevents the thinnest and most flexible part in each tyre wall from coming into contact with kerbstones, but it protects the tyre in many other ways from injury, say when the tyre is overloaded or travelling on badly cambered roads, or turning corners sharply, or passing over potholes or when subjected to those abnormal working strains which often prematurely destroy existing inflated tyres. It is to be specially noted that under correct working conditions, the extreme treading circumference of my tyre has a greater flat area in road contact circumferentially than existing pneumatic tyres of similar dimensions and that the effective width and circumferential flat area of the tread of my tyre is ever changing according to the load carried shock received or road travelled on.

My new and special construction of wide and resilient tread enables the tyre to stand shocks which would destroy the foundations of existing tyres, without my tyre being injured, and it is to be noted that the rubber in the apex 9

of the gable-like tread is automatically compressed when in action, and the more severe the strain, the greater is the rubber compression and this compression takes place over the wide tread without the fabric or cord foundations of the tyre cover being injured. The wide tread is constructed of such a gable-like shape in cross-section that it is able to give much and become flat in cross section under load or shock, and this construction of tread enables the extreme apex of the tyre to come into road contact and be put under compression before the full width of the tread comes into action.

With this new construction of tread there is a reserve of tyre width, or what I will call a margin of safety in the tread which automatically comes into effective action as and when required, say when running over tramway lines or passing over potholes, and although the apex or extreme treading circumference 9 of my tyre has more give in road contact than what I call the margin of safety part of the tread 1, 2, yet this margin of safety part is also very resilient.

I preferably strengthen and stiffen each tyre wall close to their base beads at 5 and 6, and mould on the outside of each wall an endless cushioning rubber rib 10, 11, which ribs lie outside the tyre's metal retaining rim. This construction of tyre cover compels the severest flexing of the tyre walls to take place close to the widest part 7 and 8 of the air chamber, see Figure 2, and those places which are strengthened and stiffened above and below the belly part 3, 4, 5 and 6 in my cover, are saved from premature collapse under severe working conditions.

In this invention, the wide tread and walls of my tyre cover may be built up in any efficient and well-known manner with fabric, cord, or other suitable foundations, provided the gable-like treading circumference of the tyre is constructed to become flat in cross section under load or shock, thereby causing a great flat area circumferentially to be obtained in road contact under ordinary and abnormal working conditions, the extra width or margin of safety in the tread coming into effective action as and when required. The difference in the extreme diameter of the apex of the tread and the extreme diameter of the right and left edges of the tread may be 2 to 4 inches, and the width of the tread may be $\frac{3}{4}$ inch to $1\frac{1}{4}$ inches wider than the extreme width of the belly part of my tyre, according to the type or dimensions of the tyre manufactured, but in all cases, the extreme width of the tread is preferably sufficient to protect the belly part of the tyre where the walls are thinnest from kerbstones, even when the tyre is under-inflated. The internal circumference of the tyre cover in cross section may be constructed similar to the internal circumference of existing tyre covers, and the flexible sides or walls of the tyre at the belly part are preferably formed internally to the arc of a circle so that they are able to bulge safely outwards at each side of the tyre and yet be well protected from kerbstones and other objectionable road inequalities, by the wide tread, which is not only manufactured wider than the belly part of the tyre but remains wider under all working conditions.

The tyre cover may be rigidly attached to existing types of tyre retaining metal rims, but when possible, I prefer to attach the covers with their stiff base beads (or inner tyre wall circumferences) to wheels which have removable rims, or their equivalent so that the base beads may not be seriously stretched when fitting the tyre to its metal retaining rim, and such a tyre fitment enables the toes of the base beads to be rigidly held tightly down against the metal bed of the tyre retaining rim by means of say a suitable endless band fitted between the base beads, when under such conditions of fitment the tyre cover does not entirely depend upon the compressed air within the tyre to keep it in position on its rim.

I preferably mould on each side of the apex of the tread suitable cavities or spaces 12, 13, 14 and 15 which allow the road grease and mud to flow into said cavities or spaces when the extreme circumferenc of the tread gets into

direct biting contact with the hard road surface, thereby forming a non-skid device without the us of steel studs. The cavities or spaces formed at ach side of the apex of the tread may be endless and moulded in any suitable and well-known shape to suit the wide gable-like type of tread manufactured.

In this gable-like construction of tread, it is to be specially noted that extra strong and practically unpuncturable foundations may be used in building up the tyre cover without interfering with the tyre's great resiliency or shock absorbing qualities, because the wide treading circumference is constructed of such a shape that its extreme circumference causes that part 16, see Figure 1, of the tyre's foundation which forms the arc of a circle within the apex, to be easily and safely hinged and bent back to a considerable extent in spite of the air pressure, see 17, Figure 2, and this floxing of the tyre's outer circumference occurs without injuring the tyre's cord or fabric foundations, and causes a new technical effect to be obtained in the treading circumference.

If wanted, the gable-like treading circumference may have metal studs attached in manufacture in any well-known manner, but in manufacturing the tread with metal studs, it must be remembered that the rubber in the gable-like tread when in ground contact is put under compression and therefore the attachment of the metal studs to the tread must be arranged by the manufacturer in such a manner that the metal studs are not liable to be easily pulled away from their foundation even under severe road work, and under all conditions of manufacture the wide treading circumference must be constructed in cross section of such a gable-like shape that it automatically becomes flat in cross section with increase of load.

It is to be noted that in cross section the extreme outer circumference of my tyre, the apex 9, not only comes into contact with the road before the wider part of the tread, but it remains in close and biting contact with the road during the time the extra width 1 and 2 comes in and goes out of road contact, and the entire width of the tread when brought into action under abnormal shocks does not interfere with the biting contact of the apex 9, see Figure 2. It is, however, the extra amount of tyre wall circumferentially brought into road contact which effectively strengthens the tyre automatically with increase of load, see diagram Figure 3, which shows how the apex of the tread of say my 880 m/m tyre when under $\frac{1}{8}$ inch, 1 inch or $1\frac{1}{4}$ inches depression, may have a flat of about 8 inches, $11\frac{1}{2}$ inches, and 14 inches respectively in road contact circumferentially, see diagram lines 18, 19 and 20 and it is often the great number of inches of tyre wall circumferentially brought into road contact automatically as and when required, which saves my type of outer cover from destruction under abnormal working conditions.

In this invention I take full advantage of the gable-like resilient construction of wide tread and its ability to become flat in cross section under load or shock, to safely obtain the greatest possible amount of give in road contact in an inflated tyre under ordinary and abnormal working conditions, and this type of gable-like tread enables the combination of greater resiliency, greater strength, and greater mileage, to be obtained in inflated tyres manufactured under this invention than in existing types of inflated tyres.

This invention enables an inflated tyre to be manufactured having the advantage of a narrow effective tread, see Figure 1, without its disadvantages, and the advantages of a wide effective tread see Figure 2, without its disadvantages, and an important feature about this invention is that the tyre is very resilient under light loads and increases in resiliency and effective strength under heavy loads. The tyre's outer cover may be constructed in all required dimensions and of suitable materials, having an inner air tube 21.

It is to be noted that when using my type of outer cover and air tube suitable for say an existing 880 × 120 type of tyre cover is suitable for my 880 × 135 type of tyre cover, because the internal dimensions of the two covers may be the same.

Having now particularly described and ascertained the nature f my said invention and in what manner the same is to be performed, I declar that what I claim is:—

1. An inflated tyre or outer cover having a gable-like tread constructed in cross section the widest part of the tyre substantially as described.

2. An inflated tyre or outer cover having a gable-like tread constructed in cross section the widest part of the tyre of such a gable-like shape that it automatically becomes flat in cross-section with increase of load, substantially as described.

3. An inflated tyre or outer cover having its foundations strengthened and stiffened above and below its belly part, and a gable-like tread constructed in cross section the widest part of the tyre of such a gable-like shape that a great circumferential flat is obtained in road contact under both light and heavy loads, substantially as described.

4. An inflated tyre or outer cover constructed and operated substantially as described and illustrated.

Dated this 23rd day of January, 1918.

JOHN LIDDLE,
154, St. Vincent Street, Glasgow,
Chartered Patent Agent.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1918.

ERRATUM.

SPECIFICATION No. 115,945.

Page 6, line 54, *for* "and" *read* "an."

PATENT OFFICE,
July 26th, 1918

115,943. KILLEN'S COMPLETE SPECIFICATION. (1 SHEET)

[This Drawing is a reproduction of the Original on a reduced scale.]

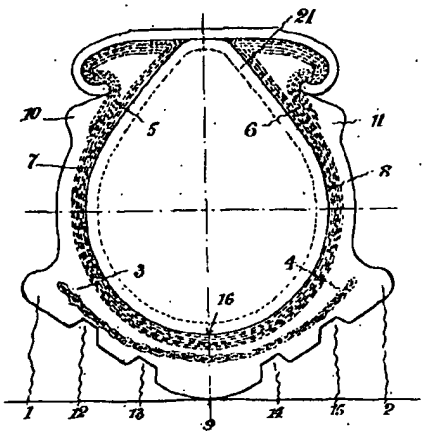


Fig. 1.

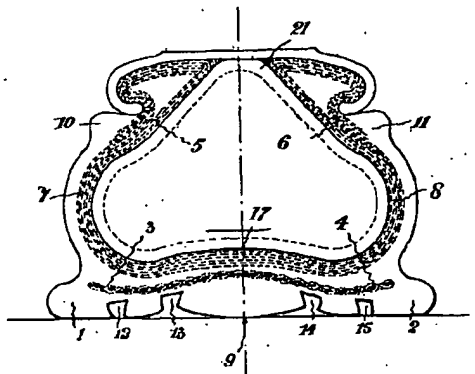


Fig. 2.

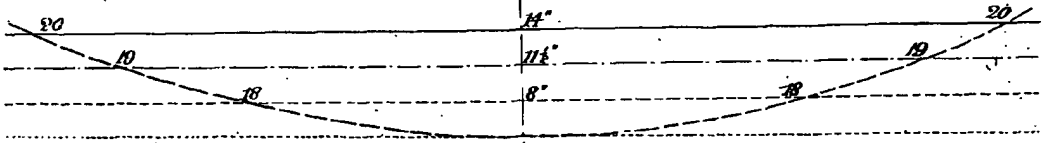


Fig. 3.

[This Drawing is a reproduction of the Original on a reduced scale]

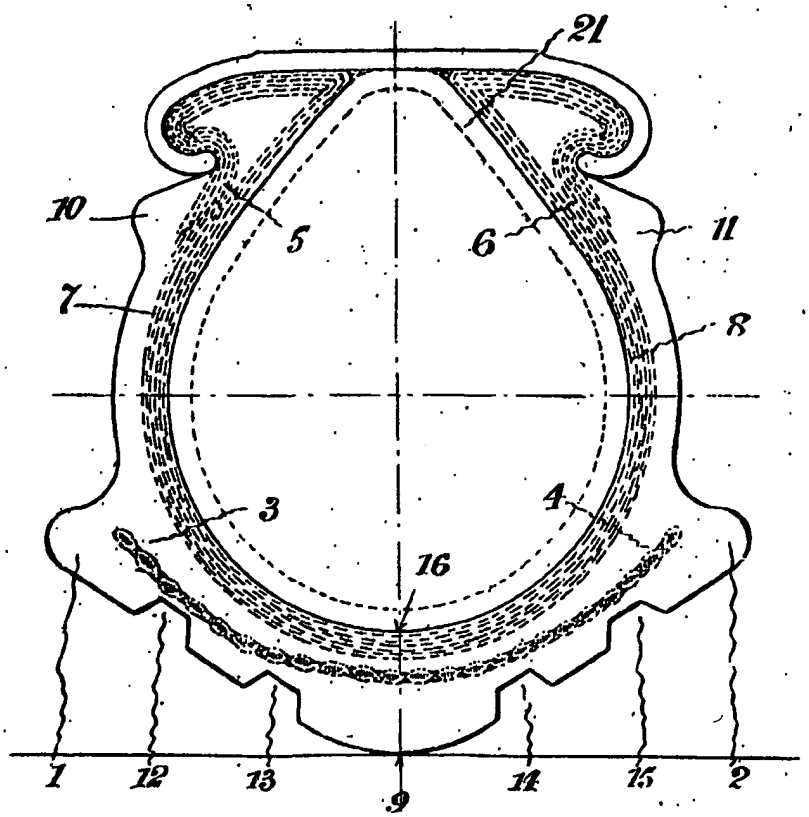


Fig 1

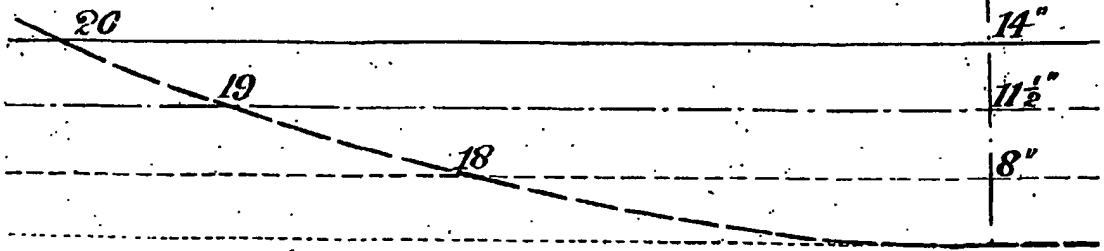


Fig 3.

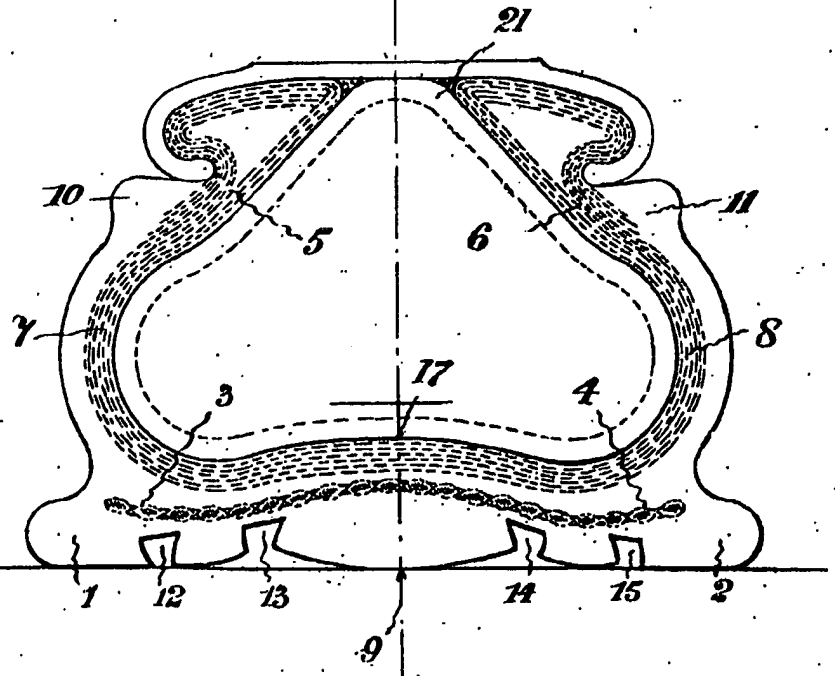
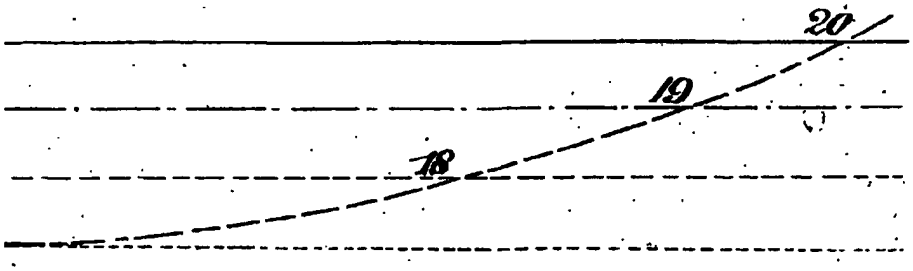


Fig. 2.



3.

Malby & Sons, Photo-Litho